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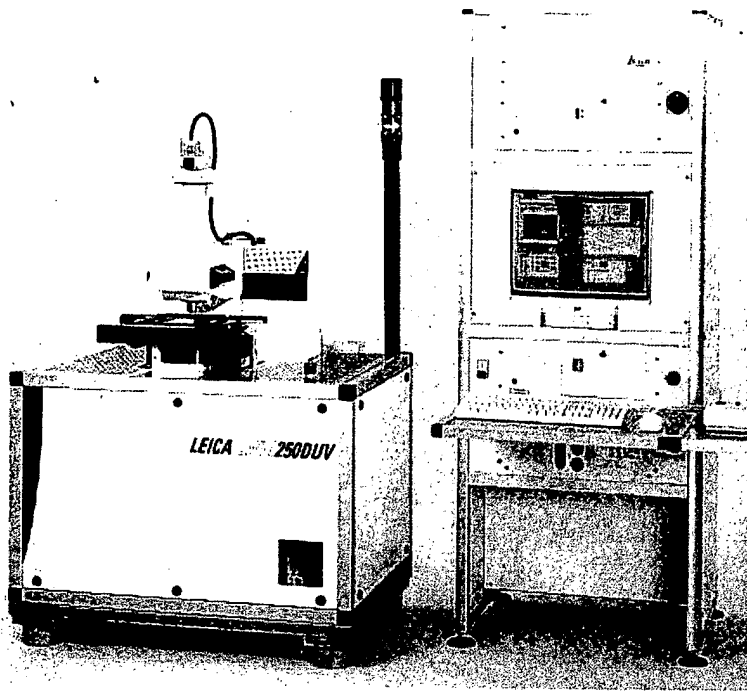
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Leica LWM250 DUV

Automatic mask CD measurement system
with DUV technology

Leica
MICROSYSTEMS

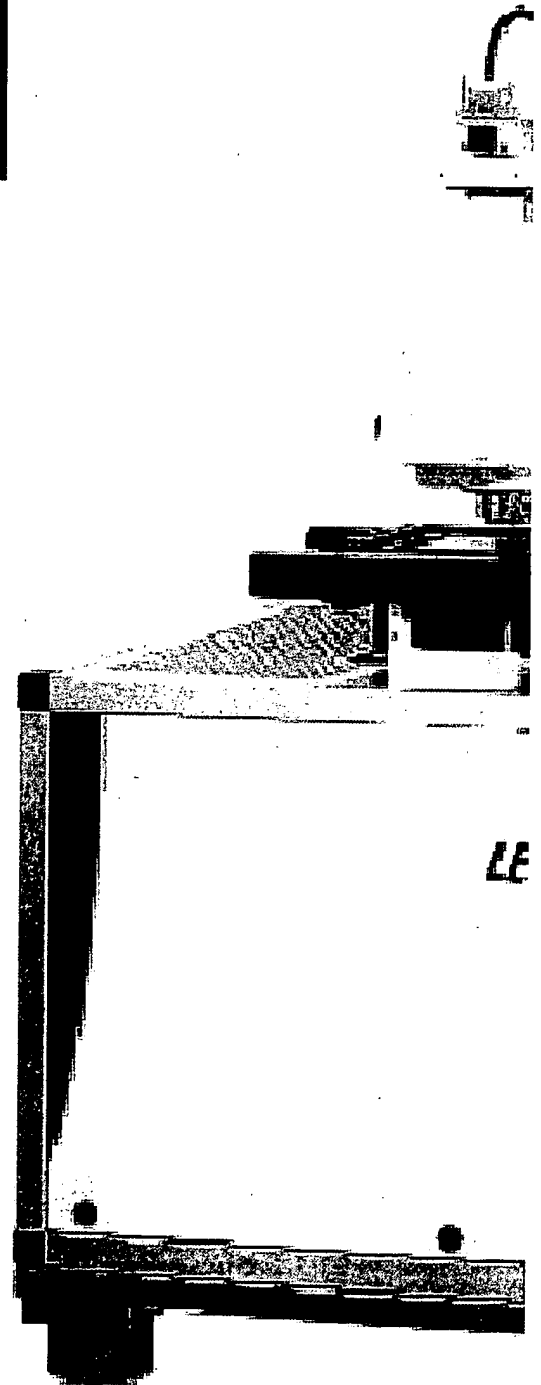
Leica LWM250 DUV

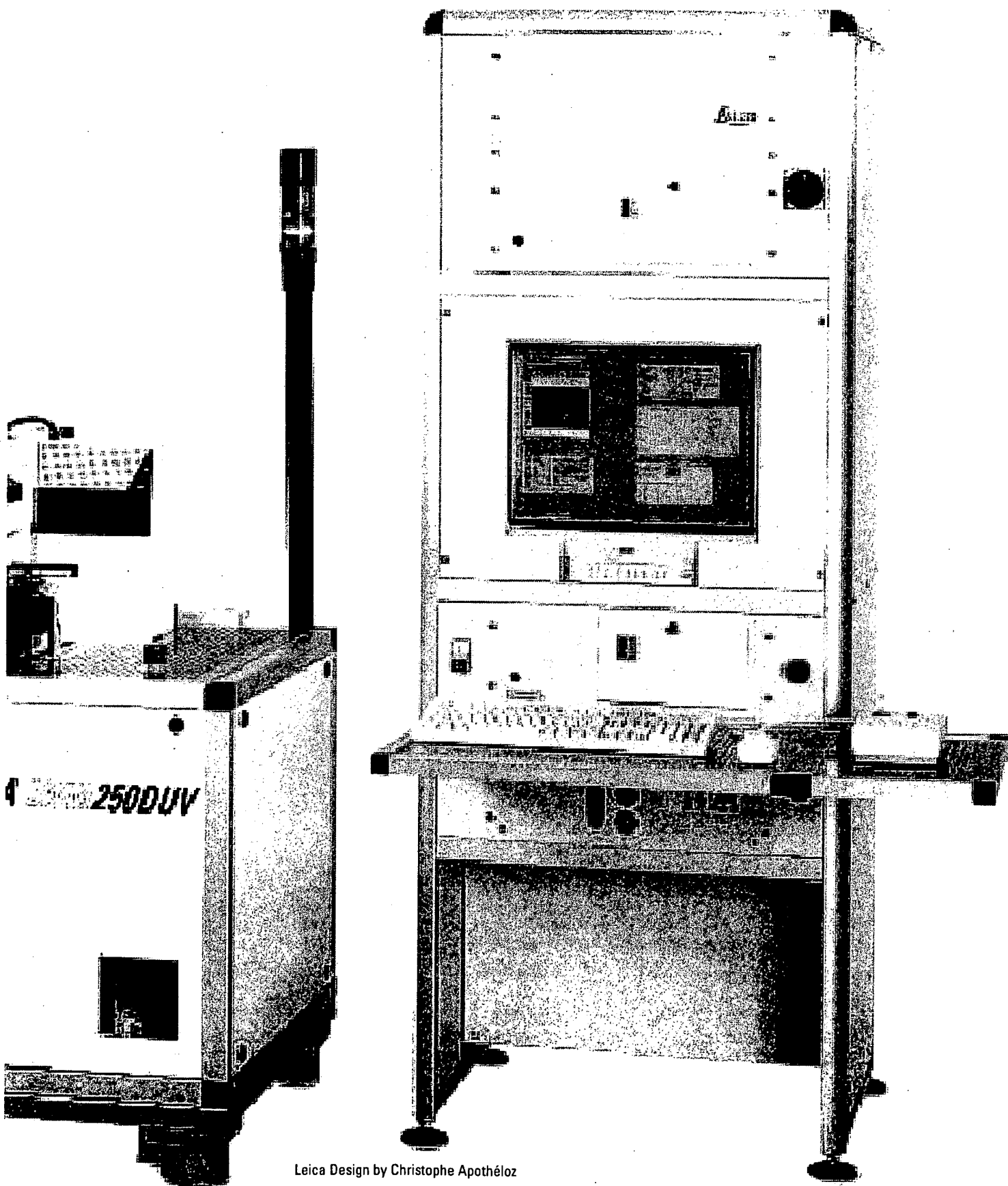
Leica LWM250 DUV was designed to meet the evolving technological requirements of the photomask industry. Our high-resolution 248 nm deep ultraviolet (DUV) optics allow accurate measurements of features as small as 0.2 microns. A variety of mask sizes and types can be measured in transmitted and reflected illumination modes. The LWM250 DUV's high precision scanning stage allows for accurate measurements on masks as large as 7 inches in size.



The LWM250 DUV is the result of an evolutionary process beginning with the LWM200 and progressing through the I-line spectrum of the 365-nanometer measurement wavelength (LWM250 UV) to the current 248-nanometer wavelength. This means higher resolution and measurement accuracy achieved by each step. Leica Microsystems unique patented optics system allows for automatic laser auto-focussing in combination with DUV optics. This means fast critical dimension (CD) acquisition time and throughput.

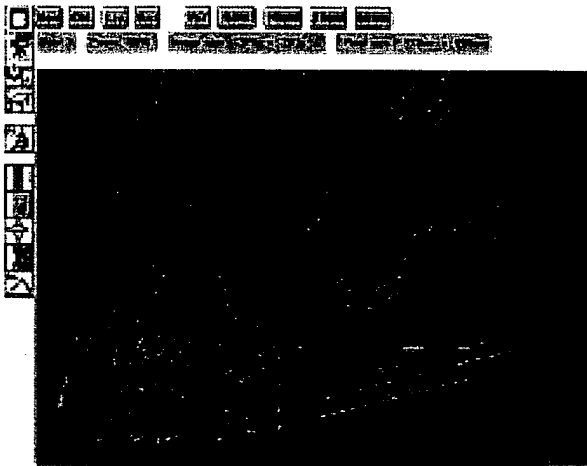
An advanced Windows NT 4.0™ graphical user interface allows for a flexible job set-up and system operation. Job set-up information can be input via Leica's LMS MF2/MF3 input formats or via ASCII scripts. It is also possible to download defect detection files from various vendors for defect classification, review, and analysis. Additionally, Leica offers an optional aerial image simulation package for evaluation of defect printability at the 248-nanometer wavelength.



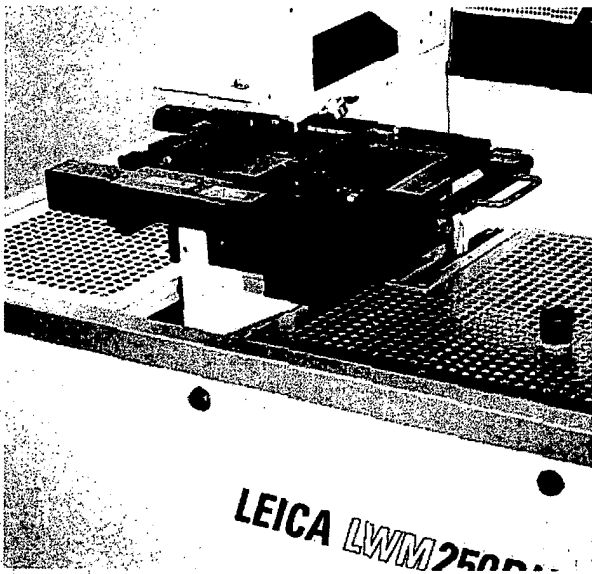


Leica Design by Christophe Apothéloz

The LWM250 DUV system features



CD measurement capability at any orientation



Secure and convenient mask loading by sliding maskholder loading system

- DUV measurement illumination in transmitted light and incident white light illumination for orientation and mask alignment
- Programmable and fully automatic selection of illumination modes and condenser positioning
- Measurement of CD's on binary, OPC, and Phase Shift Masks
- A high precision scanning stage
- Laser and TV auto-focussing for fast and accurate measurements
- The Windows 4.0™ based graphical user interface software allows easy job set-up and operation
- Measurement sites X/Y coordinate transfer via ASCII and MF2/MF3 file format
- Downloading of defect coordinates from defect detection systems for classification, analysis and after repair verification
- An optional defect printability simulation software package at 248-nanometer wavelength

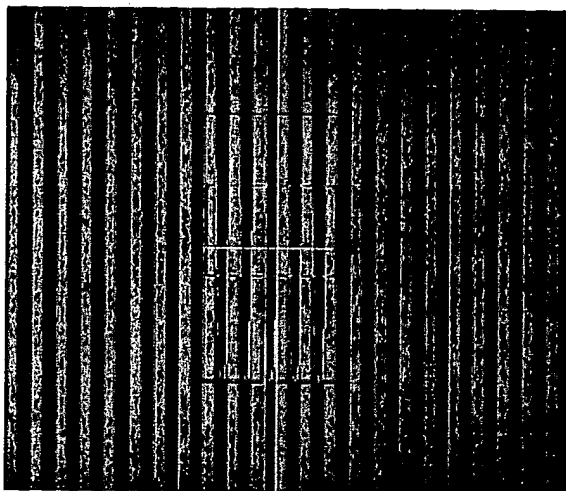
Leica Microsystems has a long history of manufacturing high quality optical systems for inspection and measurement of various substrate types. The LWM250 DUV is our current "state of the art" offering. The 248 nm fully corrected DUV optics come close to the theoretical limits for resolution. Combining these optics with laser auto-focus capability results in CD throughput at approximately 6 seconds or better per x/y site, measure-acquire-measure time (MAM). For measurement of photomask substrates this means that the LWM250 DUV can be 5 to 10 times faster than competitive systems. This feature becomes more valuable as the number of CD measurements increases due to continually tightening manufacturing tolerances.

Leica's commitment to our customers is to focus on the applications support as well as continuously improve software and hardware. Our partnership with key customers and technology leaders helps us to understand the evolving needs of the photomask industry. Our goal is to maintain a leadership role in the photomask metrology market by providing our customers with solutions and support resulting in a high degree of customer satisfaction.

$$\Delta x = k \frac{\lambda}{NA}$$



Intensity profile of submicron lines and spaces



CD measurement of submicron chromium line

There are two software modes incorporated into the system. The first mode referred to as the Macro Programming mode allows for very flexible and versatile system operation. Many different types of conditions and features may be evaluated using a single macro. Some examples of system versatility include measurement and evaluation of edge roughness, corner rounding, contacts, memory cells and line edge shortening. Virtually every parameter on the system may be controlled via the macro script language. This is especially useful in an engineering or R&D environment. The second mode called LMP (Linewidth Measurement Program) is designed for production work. It allows for operators with minimum training to quickly and efficiently perform routine measurement tasks. The combination of these two capabilities in a Windows NT 4.0 environment make the LWM250 DUV one of the most sophisticated and easy to use CD systems available today.

In an inspection mode features as small as 100 nm are resolvable with the DUV wavelength. This allows photomask manufacturers and users to evaluate and inspect features optically that previously could only be seen with scanning electron microscopes (SEMs). This high-resolution capability without the detriments of charging, pump down times, and throughput loss means users can quickly inspect OPC features.

Specifications:

Minimum line width:	0.2 μm (DUV transmitted light)
DUV (248 nm) illumination:	
Long term repeatability:	$\leq 3 \text{ nm}$ (3 sigma) on Leica CD test mask
(0.2 μm – 7 μm , XY-Direction)	$\leq 4 \text{ nm}$ (3 sigma) on chrome final and etched mask
Measuring time:	
manual mode:	$\leq 6 \text{ seconds}$ (typ.)
automatic mode*	$\leq 15 \text{ seconds}$ (typ.)
Screen XY measurement area (PL APO 150/0.90 DUV obj.):	10 x 7.5 μm^2
Screen Linearity*:	$\leq 10 \text{ nm}$ range
Motorised stage size:	6" x 6" (152 mm x 152 mm)
Mechanical accuracy with software correction:	$\leq 4 \mu\text{m}$
Repeatability:	$\leq 2 \mu\text{m}$
Maximum speed:	$\leq 20 \text{ mm/sec}$
Cleanliness:	class 1 compliant microscope

* Typical performance, depending on the measurement parameters, edge quality and substrate materials

Leica Microsystems – the brand for outstanding products

Leica Microsystems' mission is to be the world's first-choice provider of innovative solutions to our customers' needs for vision, measurement, lithography and analysis of microstructures.

Leica Microsystems, the leading brand for microscopes and scientific instruments, developed from five brand names, all with a long tradition: Wild, Leitz, Reichert, Jung and Cambridge Instruments. Yet Leica symbolizes innovation as well as tradition.

Leica Microsystems – an international company with a strong network of customer services

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The companies of the Leica Microsystems Group operate internationally in five business segments, where we rank with the market leaders.

Microscopy

Our expertise in microscopy is the basis for all our solutions for visualization, measurement and analysis of microstructures in life sciences and industry.

Specimen Preparation

We specialize in supplying complete solutions for histology and cytopathology.

Imaging Systems

With confocal laser technology and image analysis systems, we provide three-dimensional viewing facilities and offer new solutions for cytogenetics, pathology and material sciences.

Medical Equipment

Innovative technologies in our surgical microscopes offer new therapeutic approaches in microsurgery. With automated instruments for ophthalmology, we enable new diagnostic methods to be applied.

Semiconductor Equipment

Our automated, leading-edge measurement and inspection systems and our E-beam lithography systems make us the first choice supplier for semiconductor manufacturers all over the world.